

BY GREG THIELMANN,
SENIOR FELLOW
FEBRUARY 22, 2010

New START Verification: Fitting the Means to the Ends

The New Strategic Arms Reduction Treaty (New START) promises to lock in significant reductions in U.S. and Russian strategic arsenals by establishing lower ceilings on deployed weapons. The treaty's verification provisions are means to that end--providing confidence that the sides are complying with those lower limits. Although the goal is to establish the high confidence levels maintained during the 15 years of the original START (1994-2009), the successor agreement will achieve that goal with more focused and up-to-date methods, including innovative verification provisions for deployed warhead ceilings. START's multilayered limits and the elaborate verification measures flowing out of them were born of the Cold War. New START verification can be streamlined in accordance with the new, simplified limits and in response to post-Cold War realities. In assessing the new treaty, it is critical that verification provisions be judged by how well they fulfill their core function.

HIGHLIGHTS

- The purpose of including verification provisions in an arms control agreement is to provide mechanisms for increasing confidence that the sides are complying with the limits of the treaty and to provide sufficient time for a response if they are not.
- Historically, the absence of effective verification provisions in arms control agreements has not only reduced confidence in compliance, but also encouraged treaty violations and inhibited appropriate responses.
- Effective verification provisions often enhance the collection of security information, but enhancing collection *per se* is not a legitimate rationale for including them in a treaty. Verification provisions can be justified only by their relationship to the limits agreed on and their utility in monitoring, assessing, and encouraging treaty compliance.
- Although New START verification must be based on reciprocal obligations, Moscow will not perceive the burden as equal because Russia is traditionally more wary of intrusive verification measures than the United States.
- The elaborate verification provisions of START were designed in response to Cold War circumstances more dire than those we confront today. They were also intended to guard against cheating scenarios even less plausible today than they were then.
- Two decades later, national technical means of verification are more sophisticated; familiarity with Russian force structures and operations is much greater; Russia's relative military capability is much diminished; and bilateral relations are much improved. These changes permit a less elaborate verification package.
- If, as reported, the remaining issues for New START have now been resolved in principle, this means Russia is permitting measures that enable the United States to monitor mobile ICBM numbers and the United States is permitting measures that enable the Russians to count SLBM warheads.

Background

U.S. and Russian negotiators have been working overtime in Geneva to conclude a treaty that would replace the 1991 START agreement, which expired on December 5, 2009. START limited each side to 6,000 warheads on 1,600 strategic nuclear delivery vehicles. Today, each side has reduced strategic warheads and associated delivery vehicles well below the original START ceilings. The United States currently deploys approximately 900 strategic nuclear delivery vehicles; Russia deploys approximately 600.¹ The United States currently deploys approximately 2,200 strategic nuclear warheads; Russia is believed to deploy some 2,500.² By all accounts, New START will reduce by more than 25 percent the 2,200-warhead maximum allowed under the 2002 Strategic Offensive Reductions Treaty (SORT) by SORT's implementation date at the end of 2012. In stark contrast to SORT, New START will have a detailed verification regime. The new agreement promises the same high confidence in treaty compliance achieved under START's verification regime, but with more focused and up-to-date verification provisions that are more appropriate to the new treaty's specific limits and the contemporary context. This assessment will seek to explain why, 20 years after the end of the Cold War, the elaborate verification regime of START is unnecessary and why the lower limits on U.S. and Russian nuclear arsenals need to be accompanied by specially tailored and updated verification provisions.

Purpose of Verification

The object of arms control verification provisions is to give each party to a treaty confidence that the agreement's obligations are being faithfully implemented by the other party and that any militarily significant viola-

tion can be detected in a timely manner before security is jeopardized. Such provisions legitimize and facilitate procedures for monitoring compliance with the treaty's limits. Verification provisions can build trust and reduce the prudent worst-case estimates of military planners on both sides, lowering defense expenditures and mitigating tension during a crisis. Without effective verification provisions, an erosion in confidence about compliance is likely. Ensuing uncertainties can lead to a rise in one side's estimates of the other's force levels or an increase in suspicions about the other's motives and intentions. Calls for higher military spending can consequently become more urgent, and the potential for escalation of tensions in crises can increase.

The Historical Record

The history of arms control provides dramatic examples of agreements that were fatally flawed by insufficient attention to verification. The negotiated naval limitations of the interwar years—the Versailles Peace Treaty (Part V) of 1919; the Washington Treaty of 1922; the London Naval Treaty of 1930; the Anglo-German Naval Agreement of 1935—relied heavily on tonnage limits as the principal secondary unit of account after warship numbers, but provided no reliable method of verifying compliance. Combined with inadequate resolve by the other parties to enforce compliance, these flaws allowed the Japanese and Germans to build warships significantly exceeding their allowed tonnage, weakening the impact of the numerical limits on ships. The Biological Weapons Convention of 1972 contained no verification provisions and was soon being massively violated by the Soviet Union. The 2002 SORT also was conspicuous for its lack of any verification provisions. Although negative consequences un-

Table 1: Comparison of Strategic Arms Treaty Limits

This table compares limits in the 1991 Strategic Arms Reduction Treaty (START), in the 2002 Strategic Offensive Reduction Treaty (SORT) and those expected in New START.

	START (expired)	SORT (implementation date: 12/31/12; expiration date: 1/1/13)	New START (under negotiation)
Strategic Nuclear Delivery Vehicles	1,600	no limit	<800 (est.)
Strategic Nuclear Warheads	6,000 (START accountable)	2,200 (operationally deployed)	≈1,600 (est.) (operationally deployed)
Verification Provisions	yes	none	yes

der SORT were initially mitigated by the overlapping duration of START verification provisions, up-close monitoring by each side of the other's strategic forces ended with START's expiration at the end of 2009, in spite of the U.S.-Russian commitment to continue to work together in the spirit of START.³ Although some benefits from the 15 years of mutual on-site inspections persist, the absence of a new treaty would, over time, take a heavy toll.

In other cases, such as the 1972 Anti-Ballistic Missile (ABM) Treaty, the verification provisions of the agreement were ultimately effective without being elaborate or intrusive. The central limits, which featured the number of permitted ABM launchers and the number and location of ABM radars, were highly visible to optical surveillance satellites and through other national technical means. In addition, there were provisions for exchanges of data and a protocol specifying procedures and notifications for the "replacement, dismantling, or destruction of ABM systems and their components," but no advance agreement about a right to examine such activities on-site. Vigorous and sustained diplomatic efforts to investigate suspicions and reverse violations, however, compensated for the thinness of verification provisions. Verification efforts included extensive discussions and difficult negotiations within the Standing Consultative Commission and through other means, such as exerting pressure through public diplomacy and resolving ambiguities through *ad hoc* inspections. These efforts ultimately succeeded in reversing the Soviet violation of ABM Treaty Article VI(b), through the dismantlement of the large, phased-array radar at Krasnoyarsk, and in scaling back U.S. plans to develop and test space-based ABM systems based on "other physical principles," a contravention of ABM Treaty Article V. In addition, they led to agreement in 1997, though never ratified, on distinguishing between strategic systems limited by the treaty and theater systems, which were not.⁴ The United States withdrew from the ABM Treaty in 2002.

Verifying Treaty Compliance Versus Protecting Security Secrets

Above and beyond providing confidence that the parties are complying with a treaty, the information acquired as a result of exercising the verification provisions of arms control treaties helps to satisfy the critical national security requirement of monitoring potential opponents' military forces. This value was cited with reference to START by Senator Jon Kyl (R-Ariz.) when he stated on the Senate floor in late 2009 that the treaty had allowed the United States "to have confidence in its ability to understand Russian strategic nuclear forces."⁵ Gaining this understanding may indeed be desirable in providing for the nation's defense, but this benefit of arms control verification must be recognized as a collateral one. Mutually agreed provisions must be negotiated and legitimized on the basis



Konstantin Zavrzhin/Getty Images

Presidents George W. Bush and Vladimir Putin shown at the signing of the Strategic Offensive Reduction Treaty (SORT) in the Kremlin May 24, 2002. Because this treaty had no verification provisions, the parties relied heavily on START provisions for verifying SORT compliance prior to START's expiration on December 5, 2009.

of their contribution to verification of treaty limits, not to enhancing a party's intelligence database.

The military services of each side have an obligation to protect their own secrets as well as a mission to ferret out the military secrets of the other. The government in Moscow, in both its Soviet and Russian manifestations, has been historically far more guarded about revealing defense information and more suspicious of espionage than has its U.S. negotiating partner. The Soviet archipelago of secret cities where sensitive defense work was performed during the Cold War stood as powerful witness to Moscow's determination to protect security information. The practice of banning tourists from photographing train stations and airports decades after World War II illustrated the extent of the Soviet Union's obsession with security.

By virtue of the generally open nature of U.S. soci-

ety and prevailing American attitudes about the public's need to know, the United States has been more willing to tolerate negotiated measures involving greater transparency and intrusiveness than its superpower rival. Yet, the United States too has worked hard to keep secrets, most spectacularly concerning the Manhattan Project during World War II, but also on many key programs during the Cold War.

To a large measure then, arms control verification

Moreover, direct exposure of one side's operational military personnel, who possess sensitive information, to potential intelligence personnel from the other side inevitably fosters counterintelligence concerns, increasing resistance to on-site inspections.

Furthermore, those who focus on the short-term financial costs of arms control treaty implementation may resist agreement to intrusive inspection measures and definitive elimination procedures, whether

Mutually agreed provisions must be negotiated and legitimized on the basis of their contribution to verification of treaty limits, not to enhancing a party's intelligence database.

runs against the grain of national security instincts and the counterintelligence mission of the military and intelligence services of both sides. Indeed, complete transparency can pose a security threat to nuclear deterrent forces, which may depend for their survival in time of war on keeping their locations unknown. This is particularly true for mobile ICBMs. Although the number of these missiles needs to be verified by the other side, that side should not be able to track their deployed locations on a routine basis, as that would undermine missile survivability.

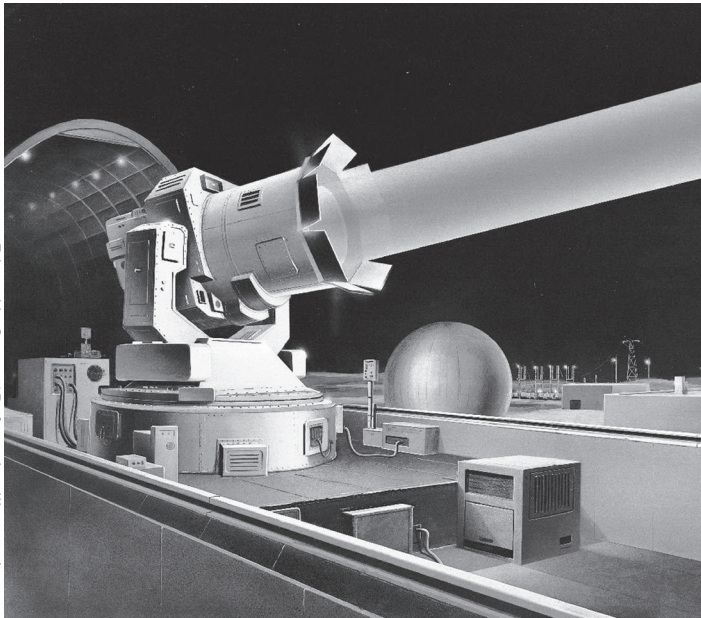
they work in Washington or Moscow. The long-term savings yielded by lowering force levels on the basis of verifiable limits rarely get thrown into calculating the budget impact.

It has nonetheless been possible in practice to construct verification provisions occupying the middle ground between insufficient transparency and overexposure. These provisions satisfy separate and countervailing military requirements, opening the sides to information collection adequate to assess treaty-limited forces accurately while protecting operational secrets required for successful mission performance. In order to win the gains of strategic arms control while maintaining the credibility of the nuclear deterrent, both objectives must be achieved.

START: Born of the Cold War

START monitoring and verification provisions were drawn up during a Cold War period of deep mutual suspicion about motives and actions and of very limited experience with up-close inspection measures. Highly improbable scenarios were taken seriously in devising START's elaborate verification schemes. Nothing was left to chance; good will was not assumed, and the benefit of the doubt was not extended.

It is instructive to review some of the assessments of Soviet capabilities that were either dominant within the U.S. government or sufficiently prominent that they had to be addressed in the treaty to give ratification efforts a fighting chance. The writings of Albert Wohlstetter, Richard Pipes, and Paul Nitze in the 1970s about Soviet capabilities and intentions⁶ set the stage for President Gerald Ford's 1976 invitation to a group of influential "outsiders," including Pipes and Nitze, to perform an alternative analysis to the intelligence community's assessment of Soviet military power. The resulting "Team B" report provided



Edward L. Cooper/ Defense Intelligence Agency

In 1986, the Defense Intelligence Agency provided this conceptual illustration of a Soviet ground-based laser, subject to discussion under the terms of the Anti-Ballistic Missile Treaty. A 1989 visit by U.S. scientists to the suspect site at Sari Shagan convinced them that the Reagan administration's characterization of Soviet laser capabilities had been vastly exaggerated.

further credibility for the argument that the U.S. government had been dangerously naïve about the nature of the Soviet threat. As a member of the revived Committee on the Present Danger, Nitze warned in 1976 of “the impending strategic imbalance,”⁷ this at a time when the United States was actually widening its advantage over the Soviet Union in strategic warhead numbers and accuracy, the survivability of its ballistic missile submarines, and the effectiveness of its bomber weapons.

Accurate or not, these hard-line views were widespread and deeply believed by members of the Reagan administration who directed the negotiations of the 1980s leading up to the final shape of START. This was especially the case in the Department of Defense. In the first edition of “Soviet Military Power” in 1983, the Pentagon emphasized the Soviets’ belief in protracted nuclear war and their perceived need for ICBM reload capabilities.⁸ It described the Backfire theater bomber as part of “operational strategic bomber forces...capable of intercontinental missions against the United States” and judged the global military balance to be “shifting steadily against the United States and its Allies.”⁹ History has ultimately proved CIA (“Team A”)

estimates of the 1970s far more accurate than those of Team B challengers on such issues as Soviet ICBM accuracy and Backfire bomber range.¹⁰ Moreover, recent access to Soviet participants and documentation shows that senior U.S. policymakers and intelligence officials in the 1980s were very slow to appreciate Soviet leader Mikhail Gorbachev’s genuine desire and willingness to make deep cuts in Soviet nuclear weapons levels. For example, in late 1987, CIA director Robert Gates wrote in a memorandum to President Ronald Reagan, “We still see no lessening of [Soviet] weapons production. And further, Soviet research on new exotic weapons such as lasers and their own version of SDI [the Strategic Defense Initiative, Reagan’s strategic missile defense program] continues apace.”¹¹ In fact, as reporter David Hoffman notes in his recent book, *The Dead Hand*, by that time, “the Soviet SDI was in shambles and would never be built.”¹² Even as Reagan’s own notions of U.S.-Soviet negotiating possibilities started to change, his advisers and those of his successor, George H. W. Bush, were conspicuously more cautious. The extensive length of START and its elaborate verification provisions were a logical outgrowth of this caution.

Figure 1: Tailoring Verification Measures to the Limits

In order to provide the information necessary to verify compliance with START’s many limits and proscriptions, a whole series of specialized measures was developed.

- **Notifications** of upcoming strategic tests and other events reduced tension and avoided misunderstandings. By receiving tip-offs, the sides could better target their technical collection assets and correctly assess nonhostile activity.
- Regularly updated **data exchanges** (hundreds of categories) facilitated understanding, enhanced confidence in force estimates, and provided the basis for more productive resolution of differences.
- **On-site inspections** (12 types, five of short notice) provided information unavailable in comparable quality through other means. For example, the parties had the right to conduct re-entry vehicle (RV) inspections of deployed ICBMs and submarine-launched ballistic missiles to confirm that the missiles did not have more RVs than the number officially attributed to them. Another provision gave each party the right to conduct distinguishability exhibitions for heavy bombers, allowing the sides to confirm the bombers’ declared technical characteristics, distinguishing, for example, which heavy bomber could carry air-launched cruise missiles and which could not.
- **Perimeter/portal continuous monitoring** at mobile-ICBM production plants was useful for ascertaining mobile-ICBM production numbers and types. Until the expiration of START, up to 30 U.S. monitors were on site at Russia’s missile production plant at Votkinsk, which produces Russia’s newest ICBMs.
- **Cooperative measures** helped make monitoring by national technical means more effective, for example, by requiring open displays on a regular basis of mobile ICBMs for review by reconnaissance satellites.
- **Noninterference with national technical means** of verification not only prevented the parties from jamming telemetry on the performance of strategic weapons during testing, but also required the sides to provide copies of their own telemetry tapes to each other. This helped prevent clandestine development tests of new or banned missile types.

Satanic Verses

The Soviet SS-18 (Satan) ICBMs, carrying 3,080 warheads (attributed according to the rule based on the maximum number flight-tested with the missile), were regarded by U.S. strategic analysts as the most threatening part of the formidable Soviet arsenal. Each SS-18 warhead was assessed to be capable of destroying a U.S.-based ICBM in its hardened silo. Tested and deployed with 10 warheads, this “heavy missile’s” enormous (8.8-ton) throw weight gave it a technical capacity to carry nearly four times the number of warheads attributed by the treaty.¹³ In a seminal 1976 article, Nitze wrote that the aim of increasing strategic stability “is not served by reducing

rine-launched ballistic missile (SLBM) launchers were allowed at test, training, and space launch sites; and limits on what was an existing versus a new type. There were also prohibitions on the production, testing, and deployment of several new types of weapons (see fig. 1).

START limits on throw weight and new missile types generated requirements to gain uninhibited access to telemetry, the signals broadcast from or recorded by the missile so engineers could measure performance during flight tests. Similarly, mobile-launcher limits led to provisions permitting on-site monitoring of missile production facilities and periodic on-site inspections of mobile-missile bases.

The circumstances bearing on Soviet strategic capabilities during the Cold War were significantly different from those of Russia today.

numbers of launchers, unless throw-weight is also reduced and made more equal.”¹⁴ The START warhead attribution rule for missiles and its limit of 154 heavy missiles and proscription on the production, testing, and deployment of new types of heavy ICBMs were thus seen as significant achievements. The need to be sure that operational SS-18 launcher numbers were being brought under START’s numerical limits was one of the compelling reasons for the demanding elimination procedures specified by the treaty.

Verification Provisions Flow From Treaty’s Limits

Detailed and extensive verification and monitoring measures were written into the treaty because START had included comprehensive limits to contain threats and rule out a wide range of cheating scenarios. These limits not only included the number of deployed strategic nuclear delivery vehicles, but also a range of nesting sublimits and interconnected definitions. The treaty specified the number of warheads attributed to each strategic missile or bomber type and then limited the number of warheads each type could carry; how many could be carried by ICBMs; how many by heavy ICBMs; how much aggregate missile throw weight would be allowed; how many warheads could be downloaded before the “bus” would have to be destroyed and replaced with one that conformed to the actual reduced number of warheads; how many nondeployed mobile missiles and launchers would be allowed, with separate limits for road-mobile and rail-mobile launchers; how many ICBM and subma-

Redundant Capabilities

START verification measures were cross-fertilizing and sometimes deliberately redundant, providing protection against single-point failure so there would be more than a single stream of information with which to assess compliance. Measures such as the ban on telemetry encryption of missile flight-test data and the exchanging of telemetry tapes made significant contributions to raising confidence levels that the sides were complying with treaty provisions. However, uninhibited access to telemetry broadcasts or the receipt of tapes was generally confirmatory, building on or refining information already collected. Rocket science is precise and well understood. Returns from U.S. radar and infrared sensors deployed offshore, which could be collected and analyzed without cooperation from Russia, played a major role in establishing the original database for individual systems. Other fortuitous opportunities were exploited as well, such as retrieving and examining spent Soviet missile nosecones from the floor of the Pacific during the 1960s.¹⁵ Up-close perusal of Russian strategic systems under START thus confirmed and sharpened the previous picture gained by national technical means.

Then and Now

Whatever role fear and overestimates played in prompting START’s extensive and elaborate limits, the circumstances bearing on Soviet strategic capabilities then were significantly different from those of Russia today. START was negotiated when Moscow could command the full resources of all 15 Soviet republics, including the spacious nuclear and missile test ranges of Kazakhstan and the prodigious



Vladimir Rodionov/AFP/Getty Images

President Dmitry Medvedev (center), stands in front of a Russian road-mobile Topol-M (SS-27) ICBM. Although much smaller and with far fewer warheads than the 1980s-vintage SS-18 ICBM on which START limits focused heavily, this modern system is less vulnerable to surprise attack and is more survivable in the launch phase against potential U.S. missile defenses. Monitoring Topol-M numbers would be a key objective of New START.

missile production and design facilities of Ukraine, home to the SS-18 ICBM design bureau and manufacturing plant. In addition, the Soviet Union benefited from the in-depth defense permitted by the forward deployment of Soviet forces in Central Europe and the reinforcements provided by the armies of Moscow's Warsaw Pact allies.

The sophistication of national technical means such as imagery and signals intelligence has taken a quantum leap since the days when START was negotiated. Dramatic advances in commercial optical imagery systems during the last 20 years suggest parallel if not completely proportionate improvements in classified imagery technology. The French SPOT satellite was advertising a ground resolution of 25 meters in 1988¹⁶ and 2.5 meters in 2010.¹⁷ In 2008, GeoEye launched a satellite claiming a resolution of 14 inches (0.36 meters).¹⁸ A similar evolution of steadily increasing resolution has been reported in succeeding generations of imaging radar satellites.¹⁹

Fifteen years of treaty implementation and resolution of differences in START's Joint Compliance and Inspection Commission (JCIC) have likewise broadened and deepened the knowledge base of the two sides concerning each other's strategic systems and operating procedures, and it has raised the level of mutual understanding and trust. The overall impact of START verification provisions was to give the sides a very robust understanding of the strategic threats they faced. Moreover, this information has been collected and confirmed without jeopardizing the credibility of either side's deterrent.

Votkinsk

New START will eliminate some of the more onerous requirements of the past treaty. The perimeter-portal continuous monitoring (PPCM) facility at Votkinsk is a case in point. It was first established under the 1987 Intermediate-Range Nuclear Forces (INF) Treaty to ensure that no new Soviet SS-20 intermediate-range ballistic missiles were produced, parallel to the establishment of a similar facility for the Soviets in Magna, Utah, to assure them that no new Pershing II medium-range ballistic missiles were being produced. With both sides planning to deploy mobile ICBMs to provide a significant percentage of their overall ICBM warheads, PPCM continued operating under START, although with a significantly reduced number of monitors. A similar facility was briefly established at Pavlohrad, Ukraine, site of rail-mobile SS-24 ICBM assembly. The monitoring operation limited breakout potential by counting actual missile production at the source and ensured that no new types were being introduced undeclared into the Russian arsenal. With the elimination of all INF systems under the INF Treaty and the end of new U.S. Peacekeeper ICBM production in the late 1980s, there was no longer a U.S. facility for the Russians to monitor. Russia, however, was still producing land-based mobile strategic ballistic missiles at Votkinsk, including the SS-25 ICBM, the SS-27 (Topol-M) ICBM, and the new RS-24 ICBM, albeit at a much lower missile production rate than in the past. The Russians had been chafing under this asymmetry of exposure for some time. In October 2008, the Bush administration agreed to close the monitoring facility at Votkinsk when START expired in December 2009 as part of a larger proposal that was never concluded or even actively discussed. When the date arrived for the treaty to lapse, the facility was closed.

New Challenges

In some cases, new solutions will be required to meet new verification challenges. One example concerns the monitoring of actual warhead loadings on SLBMs. In START, the task was to confirm that the number of warheads deployed on a particular ballistic missile did not exceed the number attributed to it under the treaty. In New START, the task will be to confirm the actual number of warheads on a particular ballistic missile, because the United States apparently intends different

warhead loadings on same-type missiles in individual submarines.²⁰ Even in the less demanding contingency of START, Russia repeatedly complained for years in the JCIC that it was unable to confirm the number of warheads on U.S. SLBMs during RV inspections because the U.S. Navy was using a single hard cover for the entire front section of the Trident missile. Given Russia's dissatisfaction with its ability to monitor maximum Trident warhead loading adequately under START and with that treaty's limitations on RV inspections (only 10 annually), it was obvious that additional measures would be required to satisfy the Russians in the new treaty.

Likewise, as Russia replaces its aging SS-18 and SS-19 land-based ICBM force, partly with the production and deployment of new, road-mobile ICBMs, the United States has an interest in verifying that the number of deployed ICBMs and warhead loadings do not exceed New START's ceilings.

"What's Sauce for the Goose Is Sauce for the Gander"

Disagreement over telemetry limits in New START was reportedly one of the last major hurdles to reaching closure in the negotiations. There is logic in arguing that more transparency in the testing of new Russian missile systems would be in the interests of mutual stability as well as U.S. security. Similarly, there is logic in the argument made by Russian Prime Minister Vladimir Putin in Vladivostok at the end of 2009 that, just as the United States wants information on new Russian strategic offensive systems being tested, Russia wants information on new U.S. strategic defensive systems being tested.²¹ After all, U.S. missile defenses could potentially intercept Russian offensive missiles. However, Putin's wish cannot be justified as a New START verification measure if the agreement does not limit strategic defensive systems. The guidelines announced by Presidents Barack Obama and Dmitry Medvedev in July 2009 included no limits on strategic missile defenses. Whether START-style telemetry exchanges can be justified by the terms of New START remains to be seen.

Although the need for transparency will continue in New START, how it is operationalized will be different, in accordance with the specific provisions being verified. In every category of verification and monitoring measures, the provisions negotiated will reflect the specific kind of information needed to solve a particular verification problem. A new treaty will generate new needs, but long years of intensive interactions between the sides and hard-won familiarity with the patterns and practices of the strategic forces increase confidence that the negotiators will find acceptable solutions to the verification challenges the sides face. Combining the significant reductions charted by the new agreement with a leaner but still effective verification regime will constitute a positive new start on the long and difficult journey away from the danger of nuclear war.

ENDNOTES

1. Robert S. Norris and Hans M. Kristensen, "Russian Nuclear Forces, 2010," *Bulletin of the Atomic Scientists*, January/February 2010, p. 76, <http://the-bulletin.metapress.com/content/4337066824700113/fulltext.pdf>; Robert S. Norris and Hans M. Kristensen, "Nuclear Notebook: U.S. Nuclear Forces, 2009," *Bulletin of the Atomic Scientists*, March/April 2009, p. 61, <http://the-bulletin.metapress.com/content/f64x2k3716wq9613/fulltext.pdf>.
2. *Ibid.*
3. "Joint Statement by the President of the United States of America and the President of the Russian Federation on the Expiration of the Strategic Arms Reduction Treaty (START)," December 4, 2009. <http://www.whitehouse.gov/the-press-office/joint-statement-president-united-states-america-and-president-russian-federation-ex>
4. "Second Agreed Statement Relating to the Treaty Between the United States of America and the Union Of Soviet Socialist Republics on the Limitation of Anti-Ballistic Missile Systems of May 26, 1972," September 26, 1997, para. 1, www.state.gov/www/global/arms/factsheets/missdef/abm_scc2.html.
5. Jon Kyl, "Floor statement on New START," November 21, 2009
6. See Albert Wohlstetter, "Optimal Ways to Confuse Ourselves," *Foreign Policy*, No. 20 (Autumn 1975), pp. 170-198; Paul H. Nitze, "Assuring Strategic Stability in an Era of Détente," *Foreign Affairs*, Vol. 54, No. 2 (January 1976); Richard Pipes, "Why the Soviet Union Thinks It Could Fight and Win a Nuclear War," *Commentary*, Vol. 64, No. 1 (July 1977).
7. Nitze, "Assuring Strategic Stability in an Era of Détente," p. 208.
8. U.S. Department of Defense, "Soviet Military Power 1983," pp. 17, 21.
9. *Ibid.*, pp. 24, 101.
10. Anne Hessing Cahn, *Killing Détente: The Right Attacks the CIA* (University Park, PA: Pennsylvania State University Press, 1998), p. 196.
11. David E. Hoffman, *The Dead Hand: The Untold Story of the Cold War Arms Race and Its Dangerous Legacy* (New York: Doubleday, 2009), p. 294.
12. *Ibid.*
13. Thirty-eight warheads per SS-18 missile, according to a notebook kept by Soviet Communist Party Central Committee scribe Vitaly Katayev. *Ibid.*, p. 220.
14. Paul Nitze, "Assuring Strategic Stability in an Era of Détente," p. 221.
15. Roy Varner and Wayne Collier, *A Matter of Risk* (New York: Random House, 1978), pp. 26-27.
16. John Swahn, "International Surveillance Satellites: Open Skies for All?" *Journal of Peace Research*, Vol. 25, No. 3 (September 1988), p. 236.
17. "Spot Images," February 1, 2010, www.spot.com/web/SICORP/403-si-corp-spot-images.php.
18. "GeoEye Launches High-Resolution Satellite," Reuters, September 6, 2008, www.reuters.com/article/idUSNO633403420080906?sp=true.
19. For example, see Jeffrey T. Richelson, "U.S. Satellite Imagery, 1960-1999," *National Security Archive Electronic Briefing Book*, No. 13 (April 14, 1999), www.gwu.edu/~nsarchiv/NSAEBB/NSAEBB13/.
20. Steven Pifer, presentation at the Hudson Institute, Washington, D.C., November 30, 2009.
21. "Putin Says Russia Will Build Weapons to Offset Planned US Missile Defences," Associated Press, December 29, 2009, www.guardian.co.uk/world/2009/dec/29/nuclear-weapons-russia.